Summary from the Canadian Fitness and Lifestyle Research Institute and ParticipACTION

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The Influence of Physical Activity, Sleep Duration and Sedentary Time on Adiposity in Children

Childhood obesity continues to be an important focus of public health initiatives in North America, as a considerable proportion (32%) of Canadian children are considered to be overweight or obese. There is sufficient evidence in the literature linking low levels of moderate-to-vigorous physical activity (MVPA) to high levels of adiposity in children [1]. In addition, studies have also shown that high levels of sedentary time or short sleep duration may also influence body weight in this population [1]. Studies exploring factors (e.g., movement/non-movement behaviours) associated with adiposity in children are sparse and often involve the use of suboptimal measures of adiposity [1]. Furthermore, there is a paucity of studies examining the combined influence of movement (i.e., physical activity) and non-movement (i.e., sedentary time and sleep duration) on adiposity in children [1]. Effective strategies for improving weight issues among children and adolescents will require a better understanding on how these factors are related and their impact on adiposity in children [1].

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A recent study conducted by Chaput and colleagues aimed to examine the independent and combined associations among movement/non-movement behaviours (MVPA, total sedentary time and sleep duration) and adiposity indicators (i.e., percentage body fat and weight-to-height-ratio) in a sample of Canadian children [1]. This is the first study of its kind (according to the authors) to employ the use of accelerometry (worn over 24 hours) to measure these movement/non-movement behaviours in children, and examine their inter-connections as it relates to adiposity [1].

Methods

Data for this study were obtained from the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) – a multi-national, cross-sectional study involving 12 nations (analyses of this study involved Canadian-specific data) [1]. The study sample consisted of 567 fifth grade students (aged 9 to 11) from 26 schools (English/French and Public/Catholic) in Ottawa, Canada [1].

Results

A considerable proportion of children in this sample were girls (59%), and white/Caucasian (67%). Overall, 85% of children in this study had a weight-to-height ratio (WHtR) of ≤0.5 (considered to be of low cardiometabolic risk); slightly less than half of the students had an average of 60 minutes or more of MVPA per day and reported 2 hours or less of screen time on a daily basis (43% and 45%, respectively) [1].

A small proportion of children (12%) slept 10 hours or more per day, the minimum recommended amount according to the sleep guidelines for school-aged kids [1]. Based on these findings, children and youth spend more than half of their waking hours (57%) in sedentary pursuits (consistent with findings from previous studies).

Preliminary results (unadjusted models) showed a significant relationship between movement/non-movement behaviours and adiposity indicators [1]. Further analyses were conducted adjusting for potential confounders (e.g., age, sex, ethnicity), upon which MVPA and sedentary time remained significantly associated with the adiposity indicators [1].

A final model was developed with additional adjustments controlling for the other two movement/non-movement behaviours [1]. In this final model, MVPA was the only variable significantly associated with adiposity indicators [1]. Additional analyses involving combined associations between both movement and non-movement behaviours and adiposity indicators produced similar results whereby higher levels of MVPA among children were associated with lower values for body fat percentage and weight-to-height ratio independent of sedentary time and sleep duration [1].

More specifically, children classified as having the 'least healthy pattern' (i.e., lower tertile of MVPA and sleep and higher tertile of sedentary time) had a higher percentage body fat (26.9%) compared to those with healthier behaviour patterns [1].

References:

- Chaput JP, Leduc G, Boyer C, Bélanger, LeBlanc AG, Borghese MM, Tremblay MS. Objectively measured physical activity, sedentary time, and sleep duration: independent and combined associations with adiposity in Canadian children. *Nutrition and Diabetes*. 2014; e117.

What have we learned?

- Obesity is an important public health issue among children and youth in North America
- Participation in MVPA is the strongest predictor of lower adiposity independent of sedentary time and sleep duration
- These findings concur with previous studies reinforcing the need for increased focus on improving physical activity levels among children
- Unlike previous findings, sleep did not appear to independently influence adiposity in this sample, lending strength to the idea that reported associations may have been influenced by other factors

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